What is claimed is:

1. A method of transfer of a plurality of signal burst streams each comprising a succession of signal bursts from a first node to a second node, the method comprising steps of:

transmitting by said first node first-mode requests to said second node each first-mode request including burst descriptors each specifying at least a burst size and receiving from said second node a schedule including a transmission time corresponding to each of said burst descriptors; and

transmitting by said first node second-mode requests to said second node, each second-mode request including at least a flow-rate allocation, and receiving from said second node a succession of burst-transfer permits each burst-transfer permit including a permitted burst size and a corresponding transmission time.

2. The method of claim 1 including a further step of time-locking of said first node to said second node.

3. The method of claim 2 including a further step of transmitting by said first node bursts to said second node according to said schedule and said permits.

4. The method of claim 2 including a further step of receiving by said first node data packets from subtending sources and forming bursts before sending said first-mode requests.

5. The method of claim 4 including a further step of receiving by said first node data packets from subtending sources and forming bursts according to said burst-transfer permits.

6. The method of claim 5 including a further step of determining by said first node a flow-rate-allocation to each of said burst streams and computing a burst size for each burst stream according to the burst-stream's flow-rate allocation.

7. The method of claim 1 wherein said permitted burst size is a function of said flow-rate allocation.

8. In a core node of a network comprising edge nodes interconnected by core nodes, a method of bimodal burst scheduling comprising steps of:

   receiving burst-transfer requests including waiting-burst descriptors;

   receiving a flow-rate-allocation request for each of a plurality of burst streams;

   generating time-regulated burst descriptors for each of said burst streams;

   merging said waiting-burst descriptors and said time-regulated burst descriptors into a combined list of burst descriptors for each outlet port of said core node;

   and

   computing a scheduled arrival time at said core node for each burst in said combined list.

9. The method of claim 8 including a further step of sorting said waiting-burst descriptors and said time-regulated burst descriptors according to outlet ports of said core node prior to said merging.

10. The method of claim 9 including the further step of determining a burst-size limit for each of said burst streams.

11. The method of claim 10 including a further step of sending said scheduled arrival time to an edge node.

12. A bimodal core controller associated with a core node in a network comprising edge nodes interconnected through core nodes, said bimodal core controller comprising:

   a burst-descriptor generator operable to generate burst-descriptors;

   a burst scheduler operable to schedule the transfer of bursts across said core node; and

   a burst-transfer-request processor operable to:

      receive burst-transfer requests;

associate each burst-transfer request with one of a first mode and a second mode;

direct said each burst-transfer request associated with said first mode to said burst scheduler; and

direct said each burst-transfer request associated with said second mode to said burst-descriptor generator to generate burst descriptors then direct generated burst descriptors to said burst scheduler.

13. The bimodal core controller of claim 12 wherein said burst-transfer-request processor is operable to associate each burst-transfer request with a burst stream.

14. The bimodal core controller of claim 13 wherein said burst-descriptor generator is operable to generate regulated burst descriptors that are evenly spaced in the time domain for bursts associated with each of said burst streams.

15. The bimodal core controller of claim 14 wherein said regulated burst descriptors are directed to said burst scheduler for generating burst-transfer permits, each permit comprising a permissible burst size and a transmission time.

16. A bimodal burst-switching network comprising a plurality of edge nodes each having an edge controller, said plurality of edge nodes connecting to at least one core node wherein at least one edge node is operable to:

determine the proximity of said at least one edge node to a selected core node;

select a first-mode of burst transfer when said proximity is within a predefined proximity threshold; and

select a second-mode of burst transfer when said proximity is beyond said predefined proximity threshold.

17. The bimodal burst-switching network of claim 16 wherein a controller of an outbound port of an edge node determined to be within said predefined proximity from said selected core node is operable to:

form data bursts;

send descriptors of said data bursts to a core-node controller of said selected core node;

receive burst-transmission schedules from said core-node controller; and

transmit data bursts to said selected core node according to said burst-transmission schedules.

18. The bimodal burst-switching network of claim 16 wherein a controller of an outbound port of an edge node not within said predefined proximity from said selected core node is operable to:

send flow-rate allocations to said core-node controller;

receive nominal burst descriptors and nominal-burst-transmission schedules from said core-node controller;

form data bursts according to said nominal burst descriptors; and

transmit said data bursts to said selected core node according to said nominal burst-transmission schedules.

19. The network of claim 16 wherein said selected core node is a bufferless core node.

20. The network of claim 19 wherein said selected core node comprises an optical-switching fabric, a core controller, and means for exchanging time-locking measurements with at least one of said plurality of edge nodes.

21. The network of claim 20 wherein said proximity is determined as a function of propagation delay and service-quality criteria, where said service-quality criteria include burst-transfer delay.

22. The network of claim 20 wherein said proximity is determined as a function of propagation delay and flow-rate allocation.

23. The network of claim 20 wherein said at least one edge node is further operable to determine a storage index as a function of propagation delay and storage capacity at said at least one edge node.

24. The network of claim 23 wherein said storage index is determined as the ratio $\rho\times\tau/\Lambda$ where ρ is an allocated flow-rate for a burst stream, τ is the round-trip propagation delay between said at least one edge node and said selected core node, and Λ is the total size of the outbound buffer at a respective outbound port of said at least one edge node.

25. In a network comprising a plurality of independent bufferless core nodes interconnecting a plurality of edge nodes, each of said plurality of edge nodes having an edge-node controller and each of said core nodes having a core-node controller, a method of bimodal burst scheduling implemented by a first edge node selected from among said edge nodes, the method comprising steps of:

determining a total flow-rate requirement for a connection from said first edge node to at least one destination edge node;

selecting a candidate core node from among said core nodes through which to route the connection;

computing a proximity index of said first edge node with respect to said candidate core node; and

selecting one of burst-transfer modes according to said proximity index.

26. The method of claim 25 wherein burst transfer according to a first mode of said burst transfer modes includes steps of:

forming a data burst according to said total flow-rate requirement;

sending burst transfer requests, each specifying a destination edge node and a burst size, to said core controller; and

receiving from said candidate core controller a schedule for burst transmission.

27. The method of claim 26 wherein burst transfer according to a second mode of said burst transfer modes includes steps of:

sending requests for flow-rate-allocations, each request specifying a destination edge node and a flow-rate requirement; and receiving from said candidate core node burst-transfer permits each specifying a burst-size limit, a destination, and a corresponding transmission time.

28. The method of claim 27 wherein said proximity is determined as a function of service-quality criteria and round-trip propagation delay between said first edge node and said candidate core node, said service quality criteria including burst-transfer delay.

29. The method of claim 28 wherein the proximity index is determined as the ratio of the round-trip propagation delay between said first edge node and said candidate core node to a prescribed delay tolerance.

30. The method of claim 29 wherein, when the proximity index does not exceed unity, said first mode is selected.

31. The method of claim 29 wherein, when the proximity index exceeds unity, said second mode is selected.

32. The method of claim 25 further including a step of said first edge node time locking to said candidate core node, where time locking ensures that a burst transferred from said first edge node is timed to arrive at said candidate core node at an instant of time specified by said selected core node.

33. The method of claim 32 wherein said forming includes a step of aggregating data packets into a burst and said data burst is the sum of lengths of said data packets.

34. The method of claim 32 wherein said first edge node aggregates data packets into a burst so that the sum of the length of said data packets does not exceed said burst-size limit.

35. The method of claim 29 including a further step of computing a storage index based on storage capacity at said first edge node, flow-rate allocation, and round-trip propagation delay between said first edge node and said candidate core node.

36. The method of claim 35 including a further step of selecting said first mode if said proximity index is less than unity and said storage index is less than a predetermined threshold.